Chapter 11

Conjunctivorhinostomy

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Core Messages

- Conjunctivorhinostomy is indicated in patients suffering from an obliteration of the upper and lower lacrimal duct creating a lacrimal bypass between the fornix of the conjunctiva and the nasal cavity.
- The use of pedicled mucosal-lined tract techniques with temporary stenting are superior to free grafting providing primary healing with less granuloma tissue and cicatricial formation and a reduced degree of osseous proliferation in the area of the osteal perforation.
- The combination of a conjunctival flap with a cartilage-containing nasal septal flap acting as a permanent autogenous stent of the new passage seems to be the most effective surgical way.

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11.1 Introduction

In the treatment of lacrimal duct stenosis the main parameters to be focused on are cause, localization, and prior treatment of the obstruction. Endonasal dacryocystorhinostomy is the most common procedure in lacrimal drainage surgery indicated in obliterations of the lower lacrimal tract (Weidenbecher et al. 1994; Sham and van Hasselt 2000). For the repair of the upper lacrimal apparatus a variety of delicate procedures have been published. Partial integrity of the canaliculi and/or the adjacent lacrimal sac provided silicone intubation (Patel 2000), canaliculodacryocystorhinostomy (Doucet and Hurwitz 1982), fundal transposition, or conjunctivodacryocystorhinostomy including synthetic tubing (Jones 1965; Glatt and Puttermann 2000) have to be taken into consideration. Complete absence of functional upper and lower lacrimal duct structures requires a total lacrimal bypass from the conjunctival sac to the nasal cavity. Even the connection from the conjunctiva to the mediosuperior corner of the antrum may be feasible in special cases (Huang et al. 1992); however, considering physiology of the medially oriented tear flow, conjunctivorhinostomy is the method of choice for the creation of a complete lacrimal bypass (Marube del Castillo 1982; Nissen and Sorensen 1987; Walter 1997).

Within the past decades many techniques have been developed for reconstruction of the mucosal lining of the new passage, which is the key of the procedure. Attempts with free grafting of vein (Soll 1983) or buccal mucosa (Campell 1983) failed due to secondary intention healing, granuloma tissue formation, and cicatrical changes resulting in restenosis in a high percentage. Facing these problems Welham (1987) and Arden et al. (1990) described nasal and conjunctival flaps with the advantages of primary healing and temporary stenting. In 2003 a case report was published by Yung and Hardman-Lea (2003) describing a pedicle nasal septal tube for the reconstruction of lacrimal drainage passage.

In the following a survey is given on the most common techniques of conjunctivorhinostomy concentrating on the combination of a conjunctival flap and a cartilage containing nasal septal flap (Walter 1997).

11.2 Indications

The conjunctivorhinostomy is indicated in patients suffering from epiphora and chronic conjunctival irritation caused by an obliteration of the upper lacrimal tract and a complete non-functional lower passage. It is also indicated when a conjunctivodacryocystorhinostomy failed in repairing a canalicular stenosis with intact lower lacrimal system or when a restenosis occurs after previous dacryocystorhinostomy in patients with saccal and postsaccal stenosis. This may be true for patients who underwent severe trauma of the eyelids and/or of the naso-orbital bony complex. Furthermore, complete obliterations may occur in chronic inflammations, congenital abnormalities, irradiations, and in defects owing to the resection of malignant tumors. Finally, many patients with lacrimal duct obliteration belong to the idiopathic group with no detectable reason.

11.3 Contraindications

In patients with saccal and postsaccal stenosis, other, less invasive procedures (see other chapters of the book) are primarily indicated.

11.4 Operative Techniques

11.4.1 Basic Procedure

The conjunctivorhinostomy is one of the most challenging techniques in lacrimal duct repair creating a lacrimal passage between the fornix of the conjunctiva and the nasal cavity. Requiring delicate and tedious dissection, the procedure should be performed under general anesthesia. After application of vasoconstrictors to the nasal mucosa and local infiltration of the lateral nasal wall using 1% xylocain with 1:100,000 epinephrine, the skin of the medial canthal area is incised in a curvilinear fashion from the level of the medial canthal ligament along to the orbital rim (Fig. 11.1 a). This is followed by cauterization of the angular vessels and by incision and elevation of the periosteum of the lateral nasal wall, the medial orbital wall, and the frontal process of the maxilla. The ex-

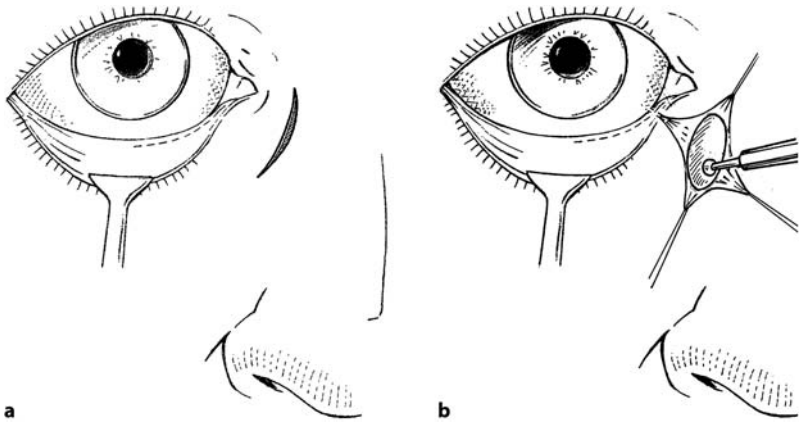

Fig. 11.1. Basic procedures in conjunctivorhinostomy. **a** Curvilinear skin incision from the area of the medial canthal ligament along the orbital rim. **b** External rhinostomy: removal of the exposed bone below the medial canthal ligament and along the orbital rim using a diamond drill

posed bone below the medial canthal ligament, along the orbital rim is removed in an area of about 1.5 cm in diameter using a diamond drill (Fig. 11 b). Taking off the bone special attention has to be paid in the preservation of the underlying nasal mucosa. For better exposure of the nasal mucosa the middle turbinate should be fractured medially from an endonasal approach. Once the osteal perforation has been completed an incision of the infero-medial fornix of the conjunctiva is done in a line just below the caruncle along the orbital rim. This is followed by blunt dissection behind the orbital septum and underneath the lacrimal sac creating a tunnel to the osseous perforation.

For the creation of the mucosal lining of the new lacrimal passage there are three options.

11.4.2 Bipedicled Nasal Mucosal Flap

According to the dacryo-fornix-rhinostomy described by Murube del Castillo (1992) a cranially pedicled nasal mucosal flap extending from the orbital rim to the nasal valve area is fashioned (Fig. 11.2 a); therefore, the nasal mucosa inferior, medial, and lateral to the osseous perforation is detached from the overlying bone using an blunt spatula with a curved end. The flap is externalized through the osseous window and divided into two parts: a superiorly based superomedial flap for reconstruction of the posterior wall of the passage and a laterally based inferolateral flap for reconstruction of the anterior wall (Fig. 11.2 a). The flaps are sutured to the corresponding posterior and anterior lip of the conjunctival incision and stented with a semirigid silicon sheet 1.5 cm wide and 5 cm long (Fig. 11.2 b, c). The stent may be removed a few days after surgery.

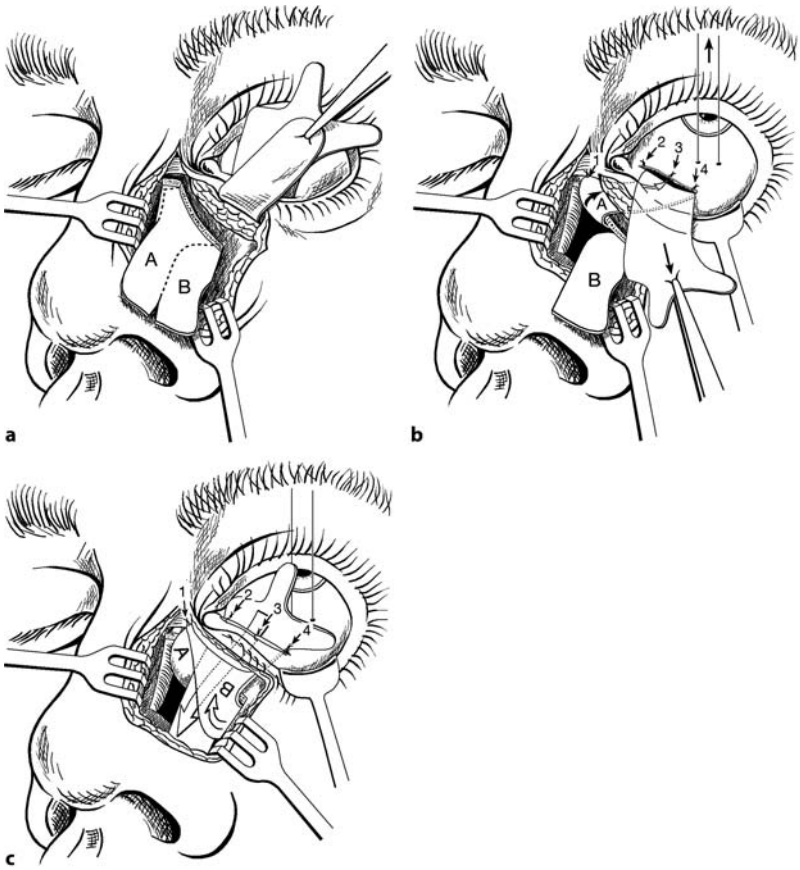

Fig. 11.2. Bipedicled nasal mucosal flap. **a** Division of the externalized nasal mucosa in a superiorly based superomedial flap (*A*) and a laterally based inferolateral flap (*B*). A silicon band is passed through the wound, and its two ends are fixed with a forceps. **b** The superomedial flap is reverted and sutured to the inferior edge of the tendo-oculi (*1*) and the posterior lip of the conjunctival wound (*2–4*), with its epithelial surface forward. **c** The inferolateral flap (*B*) is rotated, maintaining its epithelial face backwards. Its distal end is sutured to the inferior edge of the tendo-oculi (*1*) and to the anterior lip of the conjunctival wound (*2–4*). (From Murube 1992)

11.4.3 Conjunctival and Nasal Flap With Stenting

After osseous perforation, incision of the conjunctiva, and creation of a connecting subcutaneous tunnel, an U-shaped incision is done to fashion a posterolaterally based nasal mucosal flap of about 1×2-cm dimension (Fig. 11.3 a; Arden 1990). The flap is rotated upward to reconstruct the superoposterior wall of the new conduit. For complete mucosal lining of the new conduit a medially based flap is elevated from the medial conjunctiva. It is rotated downward repairing the anteroinferior side of the wall (Fig. 11.3 a; Arden 1990). Alternatively, the flap may be raised from the lower palpebral conjunctiva, 5 mm in the anteroposterior dimension and 15 mm in horizontal length (Huang 1992). Both flaps are sutured around a silicone tube of at least 2 mm in diameter facing the mucosal layer inward (Fig. 11.3 b). For approximation of the mucosal edges 5-0 absorbable sutures are recommended. After correct positioning of the tube under endonasal endoscopic control, the skin is closed in layers. Depending on the healing process, the tube will be removed between weeks 3 and 6. Only in certain cases of restenosis or severe scarring may it be indicated to leave the tube for a longer period. Nevertheless, without proper handling, tube dislodgement, infection, granuloma tissue, and scar formations may result from alloplastic material.

11.4.4 Conjunctival and Cartilage Containing Nasal Septal Flap

This technique provides a complete mucosal lining of the new conduit with additional cartilaginous support (Walter 1997). For reconstruction of the anterosuperior wall a conjunctival flap is harvested from the lower palpebral conjunctiva (Fig. 11.4 a). Dimensions of the rectangular, medially based flap are about 15 mm in horizontal length and 5 mm in width. After dissection of a subcutaneous tunnel the flap is rotated downward to the osseus perforation (Fig. 11.4 b). Reconstruction of the inferoposterior wall is done by a cranially pedicled mucoperichondrial nasal septal flap. The flap is fashioned via an endonasal approach containing cartilage of the anterior part of the nasal septum at its distal end (Fig. 11.4 b). Harvesting the cartilage, the perichondrium and mucosa of the opposite septum have to be preserved meticulously. After thinning of the cartilage using a 15 blade, the flap (1 cm in width and 3–4 cm in length) is rotated upward and sutured to the posterior margin of the incised conjunctiva using 5-0 absorbable threads (Fig. 11.4 c); thus, the cartilage lies in the critical area of the osteal perforation supporting the inferoposterior wall of the new lacrimal passage. Finally, the lateral margins of both flaps are approximated and the conjunctival flap is sutured to an inferiorly based flap of the lateral nasal wall. For short stenting of the new passage a soft silicone tube is inserted for about 10 days (Fig. 11.4 d).

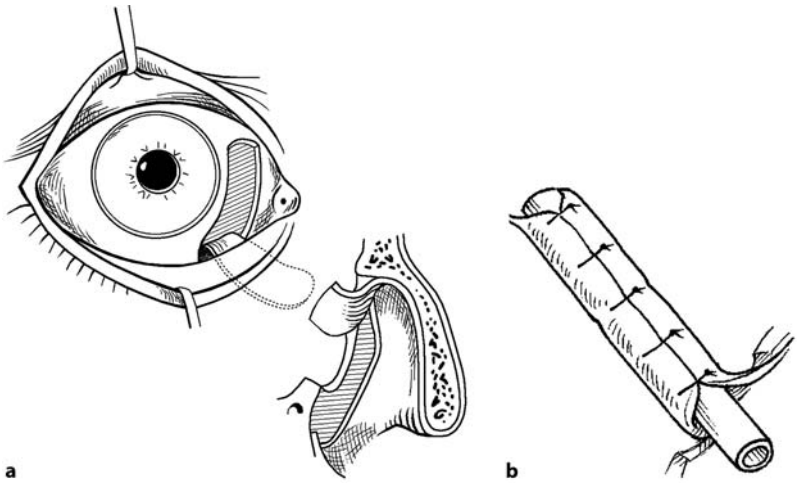

Fig. 11.3. Medial bulbar conjunctival and nasal mucosal flap. **a** Design of both flaps. **b** Tubulization of the conjunctival and nasal mucosal flap about Jones tube after rotation and end-to-end anastomoses. (From Arden 1990)

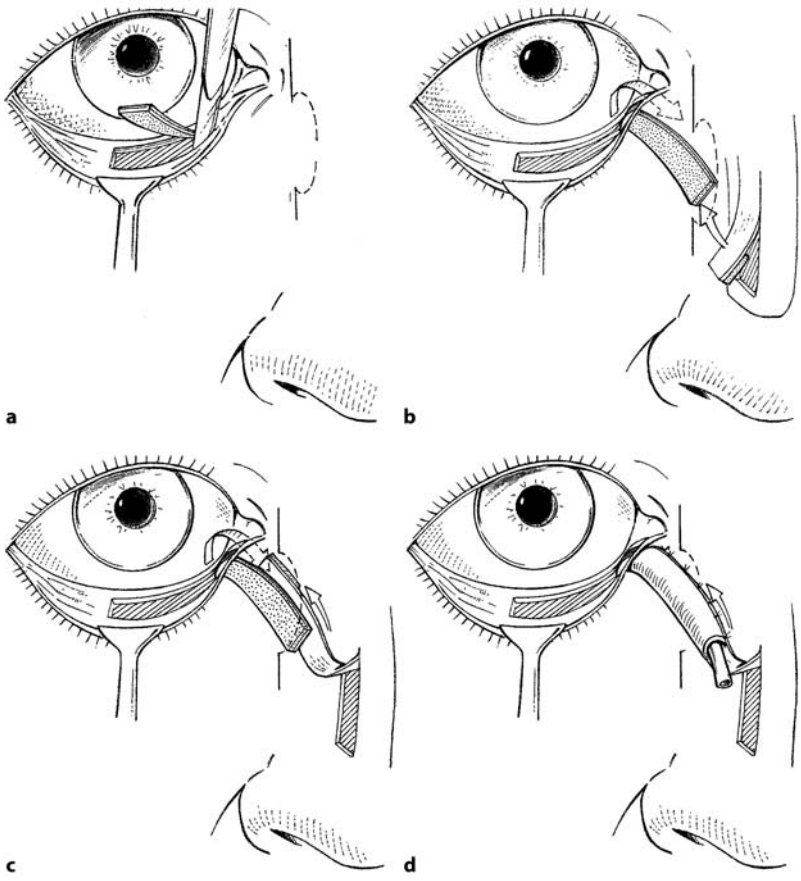

Fig. 11.4. Conjunctival flap and cartilage containing nasal septal flap. **a** A conjunctival flap is harvested from the lower palpebral conjunctiva. **b** Rotation of the conjunctival flap downward to the osseous perforation and elevation of a cartilage containing nasal septal flap. **c** Upward rotation of the nasal septal flap. Suturing of the cartilage containing distal end to the posterior lip of the conjunctival incision. **d** Temporary stenting of the new lacrimal bypass. (From Walter 1997)

The donor defect in the lower palpebral conjunctiva is closed using inverted fashioned 6-0 absorbable sutures, whereas the donor site in the nasal septum may be left for secondary intention healing. To control bleeding a nasal package is recommended for 1 day.

11.5 Postoperative Care and Complications

Prophylactic antibiotics are administered for the first week after surgery. Usually 3 months postoperatively, after complete epithelialization of the new lacrimal bypass nasal septal flaps' pedicle may be severed.

Drawbacks of tube stenting may be dislodgement, extrusion, granulation tissue formation, adhesions, nasal, and conjunctival irritation; therefore, stenting of the new duct should be avoided and practiced only for a short time when needed.

Careful and sufficient dissection ensures that all described techniques are at lower risk for corneal or scleral injuries as well as for secondary limitations of eye movements.

Although conjunctivorhinostomy with flaps of the lateral nasal wall and/or the conjunctiva with additional temporary stenting are commonly considered to be most effective in managing severe tear-duct dysfunction, they may be associated with secondary-intention healing and severe scarring. The most critical area for the development of a restenosis is the posterior wall of the new conduit next to the osseus perforation and the anterior ethmoid. Support of the lacrimal bypass by a cartilage-containing nasal septal flap provides autologous stenting of this area. Consequently, the risk for restenosis may be reduced.

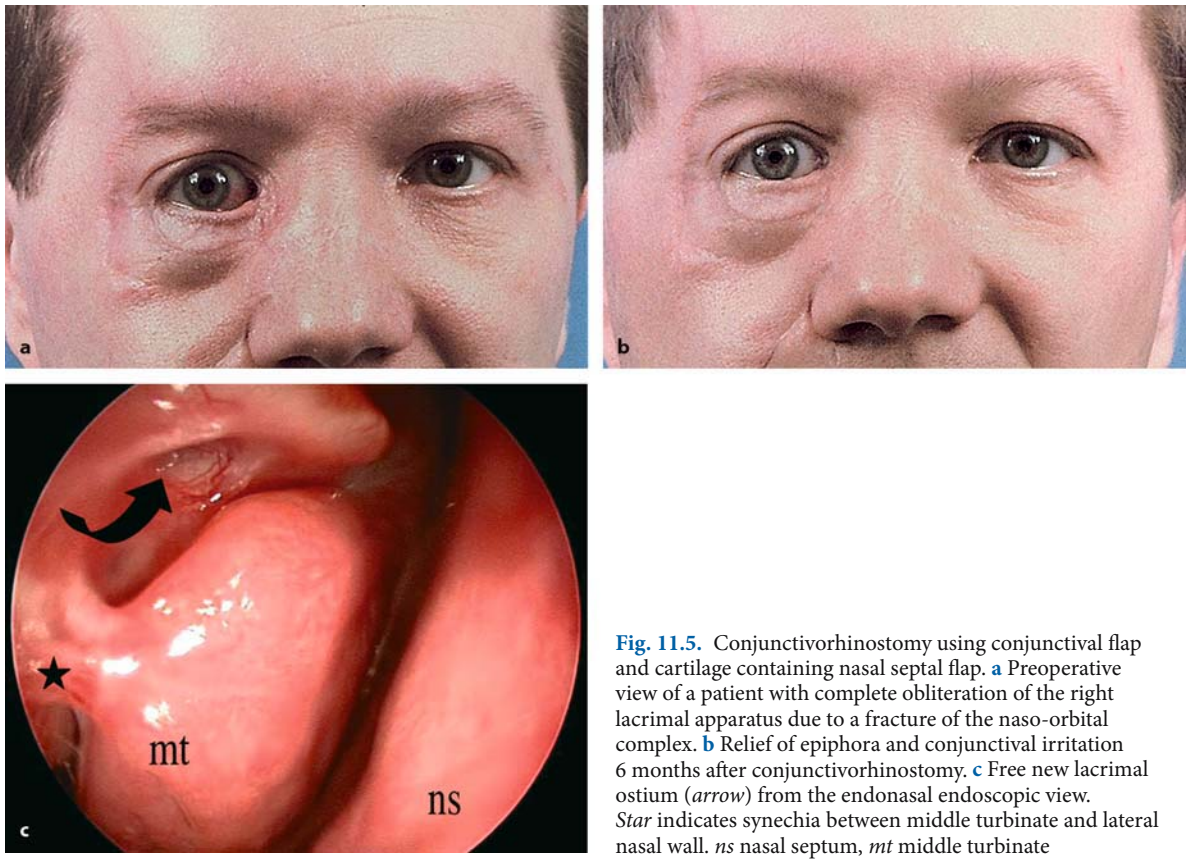

Fig. 11.5. Conjunctivorhinostomy using conjunctival flap and cartilage containing nasal septal flap. **a** Preoperative view of a patient with complete obliteration of the right lacrimal apparatus due to a fracture of the naso-orbital complex. **b** Relief of epiphora and conjunctival irritation 6 months after conjunctivorhinostomy. **c** Free new lacrimal ostium (*arrow*) from the endonasal endoscopic view. *Star* indicates synechia between middle turbinate and lateral nasal wall. *ns* nasal septum, *mt* middle turbinate

11.6 Outcome

The use of pedicled mucosal-lined tract techniques enables primary healing with less granuloma tissue and cicatricial formation and a minor degree of osseus proliferation in the area of the osteal perforation. Compared with free grafting of buccal mucosa or vein, the pedicle of the flaps puts graft take at lower risk. Preservation of the medial canthal ligament and of the caruncle prevents asymmetry. Due to its capillary attraction and the action of gravity, the mediovertical-oriented passage provides tear drainage under physiology-like conditions. Movements of the eyeball and blinking result in changes of the pressure in the fornix supporting the pump mechanics of the eye.

Clinical findings and the endoscopic assessment of the fluorescein flow into the nasal cavity show the technique to be highly efficient with relief of epiphora and conjunctival irritation in a high percentage (Fig. 11.5 a–c). Nevertheless, there is a lack of valid statistical data proving the efficacy of tear drainage quantitatively, which is true even for other techniques in conjunctivorhinostomy.

11.7 Highlights

The conjunctivorhinostomy is indicated in patients suffering from an obliteration of the upper and lower lacrimal duct creating a lacrimal bypass between the fornix of the conjunctiva and the nasal cavity. Furthermore, it has been found to be a reliable treatment option when a conjunctivodacryocystorhinostomy failed in repairing a canalicular stenosis with intact lower lacrimal system or when a restenosis occurs after previous dacryocystorhinostomy in patients with saccal and postsaccal stenosis.

Considering the various complications in the reconstruction of the new lacrimal duct, the use of pedicled mucosal-lined tract techniques with temporary stenting is superior to free grafting, providing primary healing with less granuloma tissue and cicatricial formation and a reduced degree of osseus proliferation in the area of the osteal perforation. In the present authors' opinion, among all surgical techniques the combination of a conjunctival flap with a cartilage-containing nasal septal flap acting as a permanent autogenous stent of the new passage seems to be the most effective surgical method.

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